The structure of AGNs from X-ray eclipses

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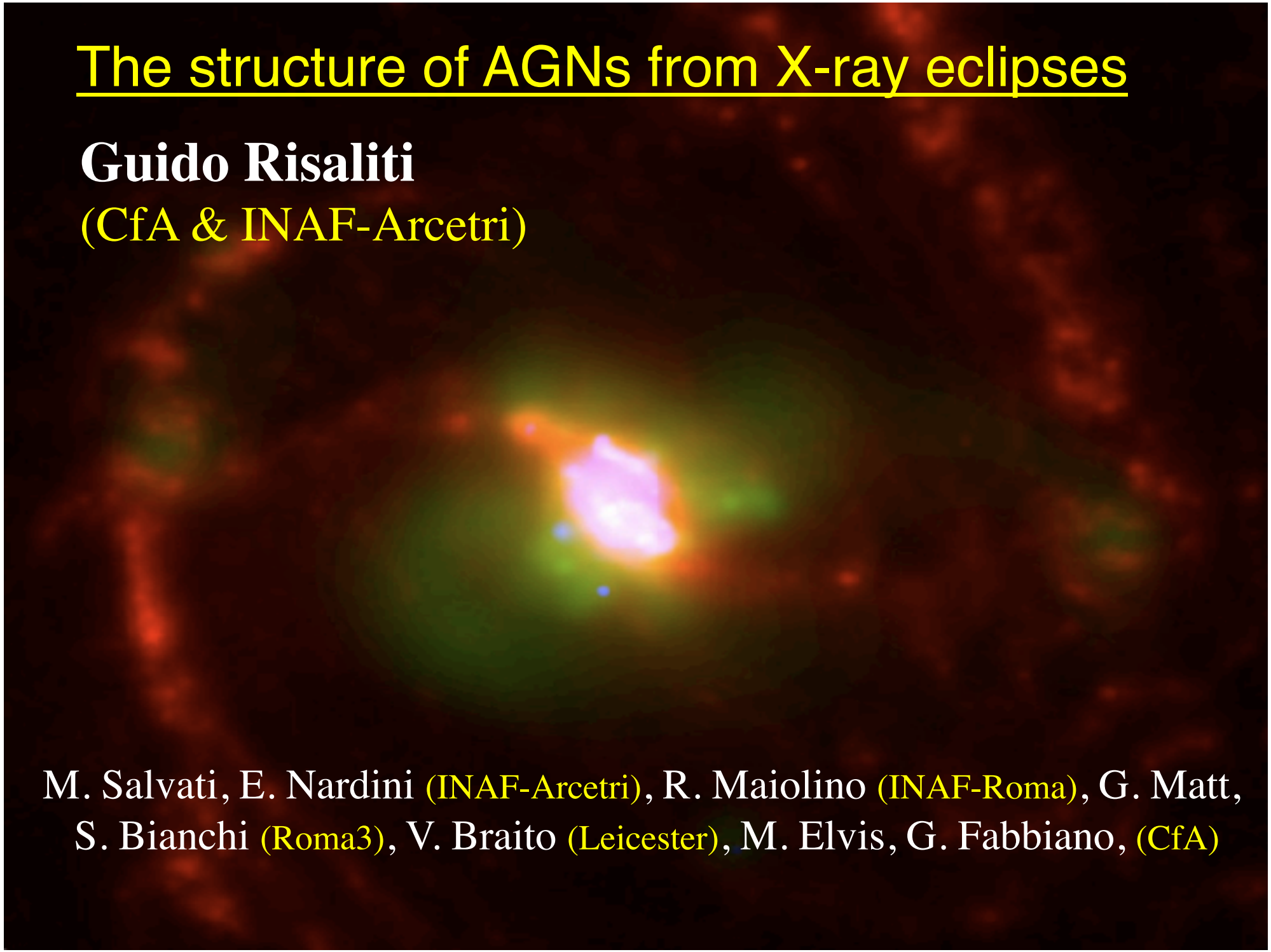

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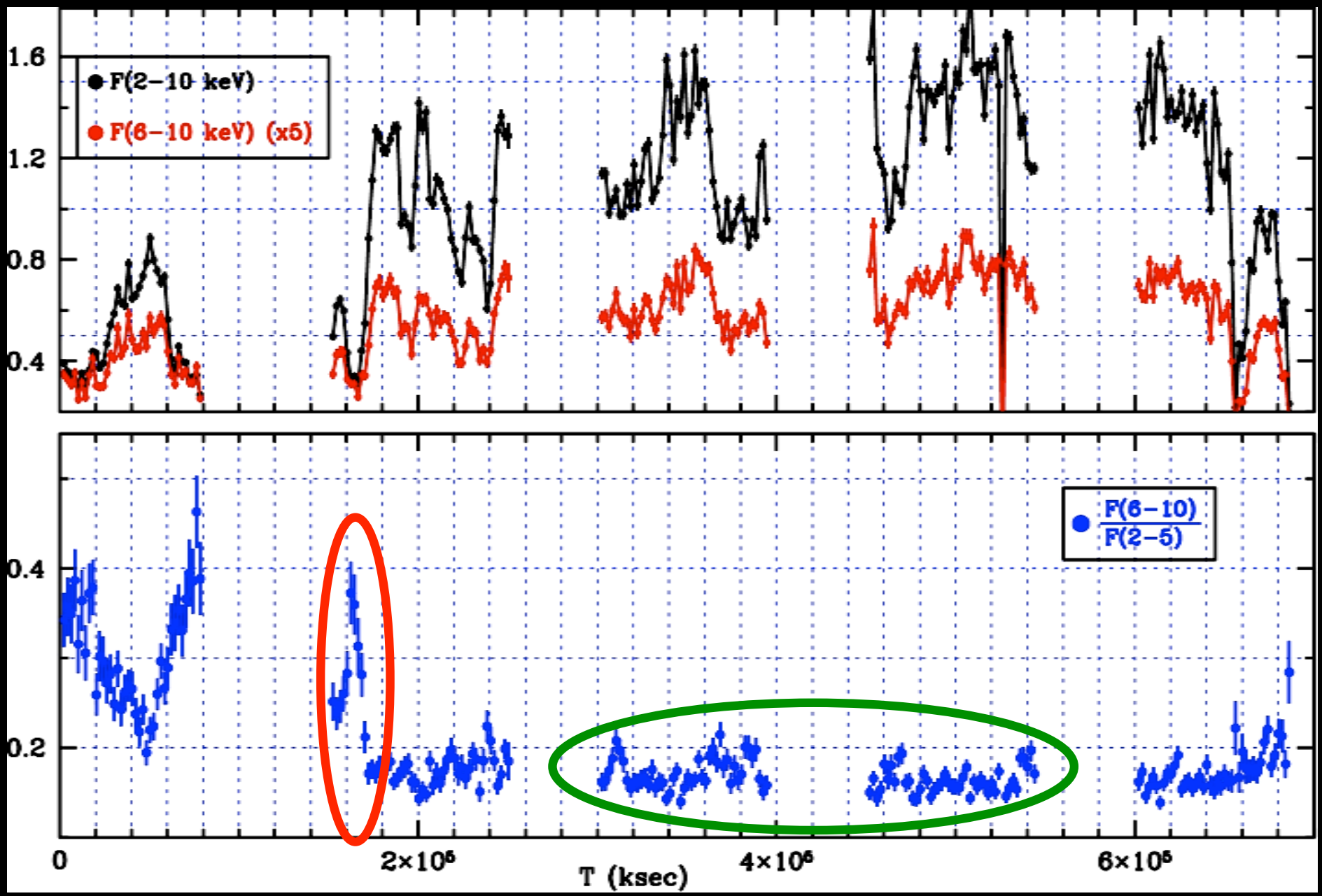
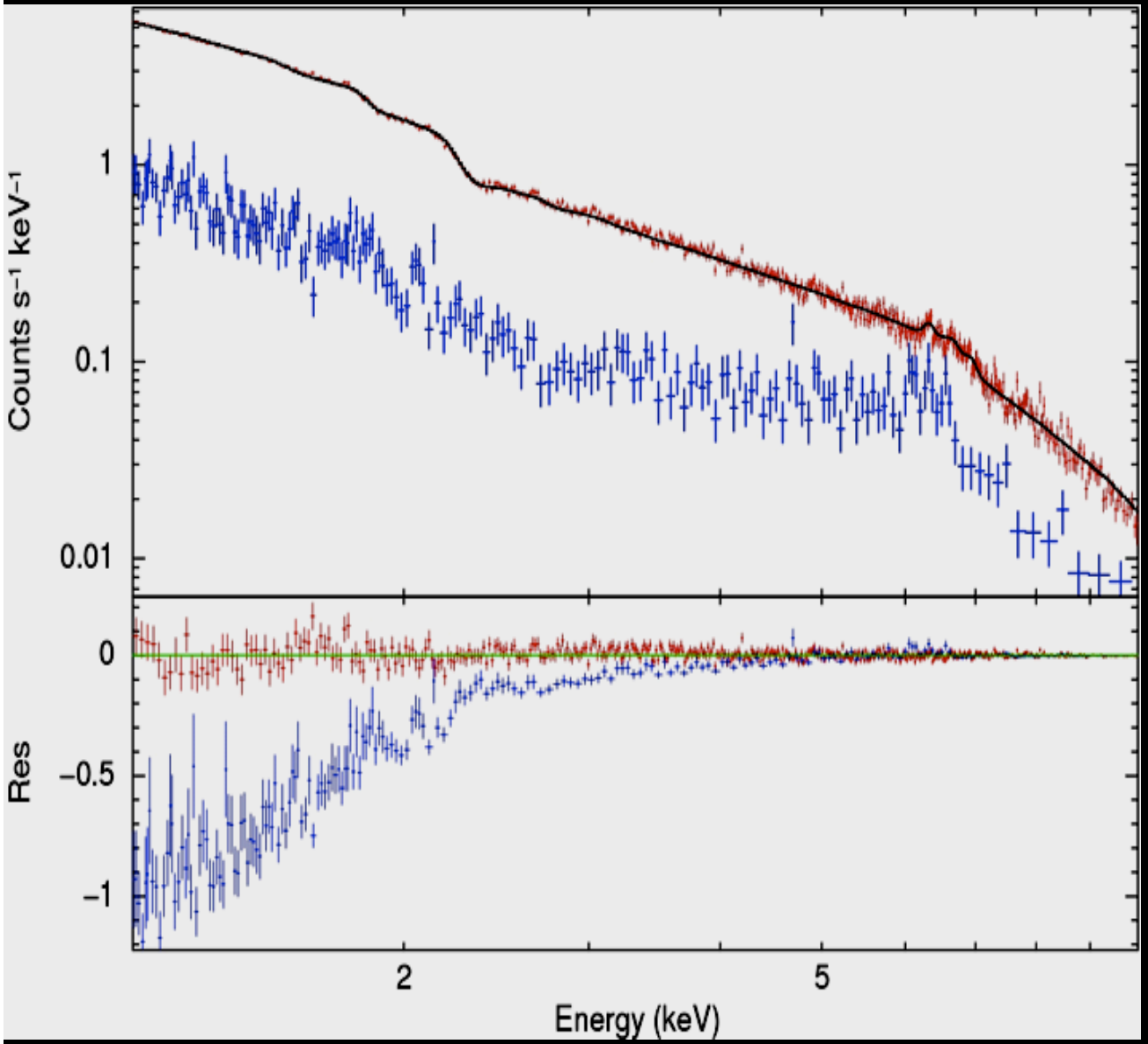
S. Bianchi (Roma3), V. Braito (Leicester), M. Elvis, G. Fabbiano, (CfA)

Method: XMM long look of Mrk 766





→ No absorption, "standard" model

→ $N_H \sim 10^{23} cm^{-2}$, C.F. ~ 80%
No continuum spectral variation

Ubiquitous Variability of N_H in Seyfert Galaxies

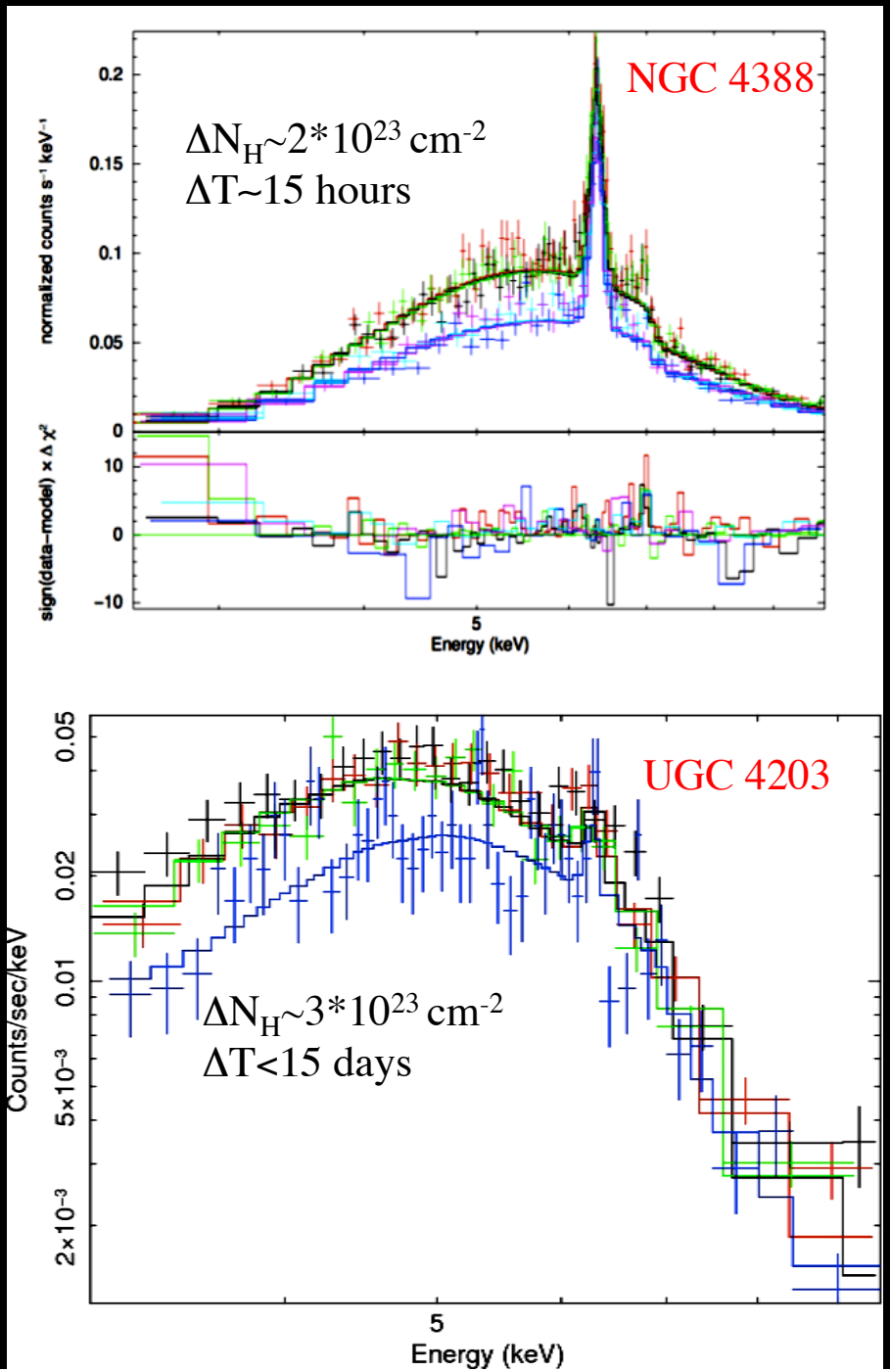
Eclipses on short time scales are common !
(~10 sources with confirmed occultations in hours-days)

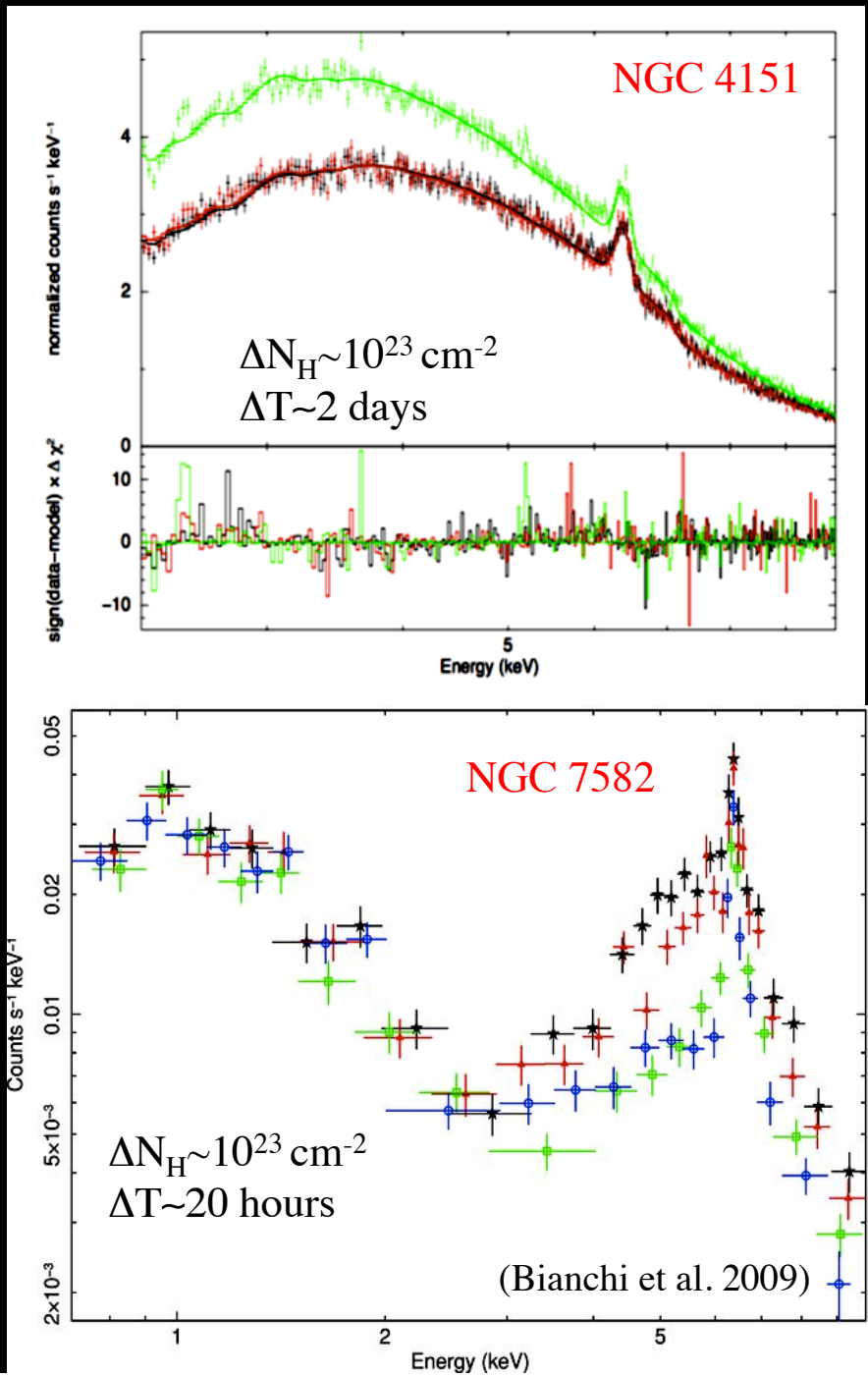
Table 1. List of sources with N_H variations on short time scales

Name	$\Delta(N_H)^a$	$\Delta(T)^b$	Method^c	Ref.
NGC 1365	$>10^{24}$	< 2 days	Snapshot	
NGC 1365	3×10^{23}	10 hours	Continuous	
NGC 4388	2×10^{23}	15 hours	Continuous	
NGC 4151	2×10^{23}	20 hours	Continuous	
NGC 4151	10^{23}	<2 days	Snapshot	
NGC 7582	10^{23}	20 hours	Snapshot	
Mrk 766	3×10^{23}	10 to 20 hours	Continuous	
MCG-6-30-15	10^{23}	10 hours	Continuous	
UGC 4203	3×10^{23}	< 15 days	Snapshot	
NGC 3227	7×10^{22}	1 day	Continuous	
NGC 4395	3×10^{23}	10 hours	Continuous	

(Risaliti et al. 2010)

Finding more sources with eclipses in ~hours-days





Future IXO observations of AGN eclipses

- 1) Structure and properties of X-ray absorber:
  → "Cometary" shape of clouds
  → distribution of cloud velocities

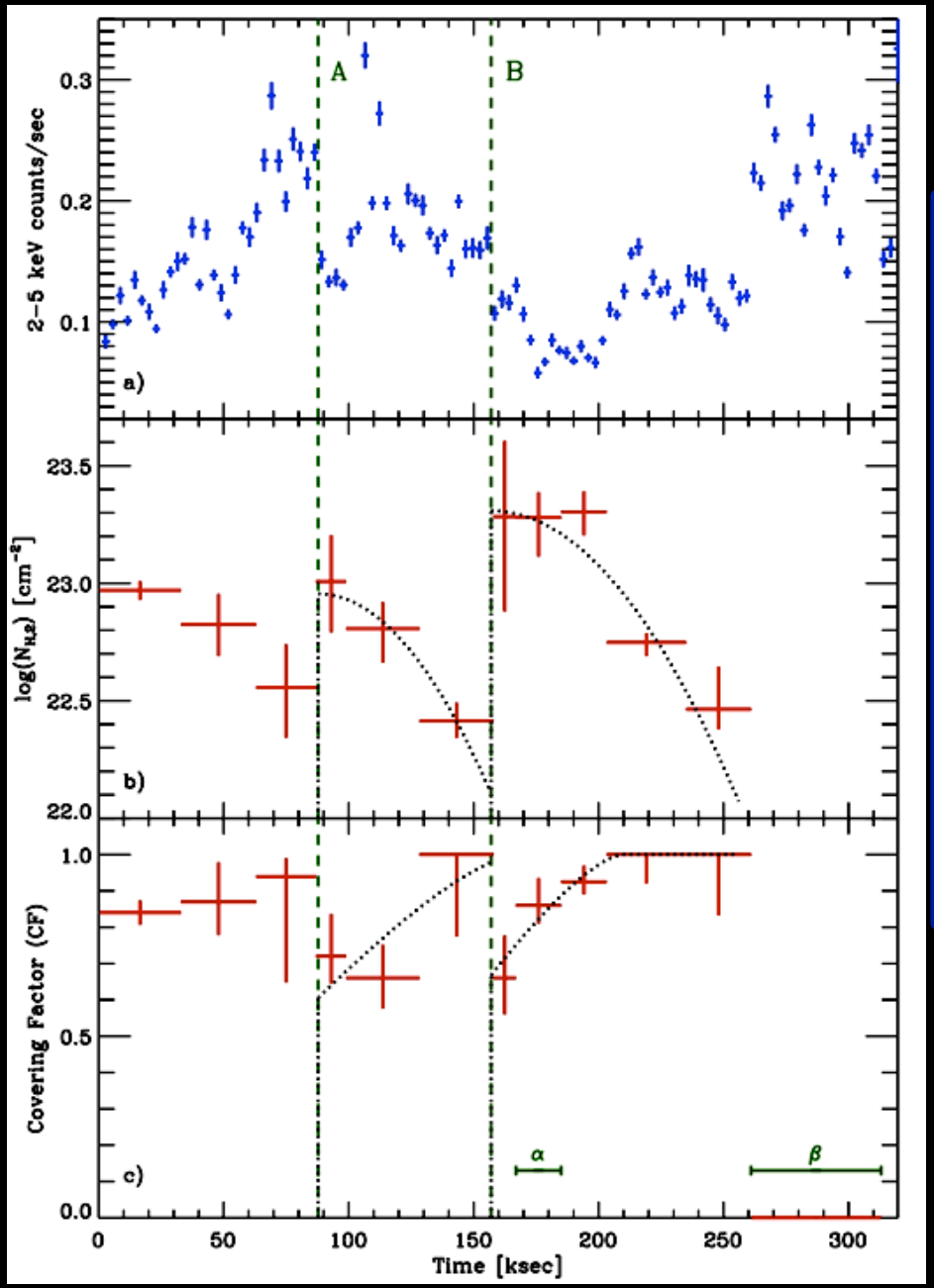
- 2) A possible experiment of "disc tomography"
  → probing general relativistic effects through iron line variations during an eclipse

1) Structure of the absorber

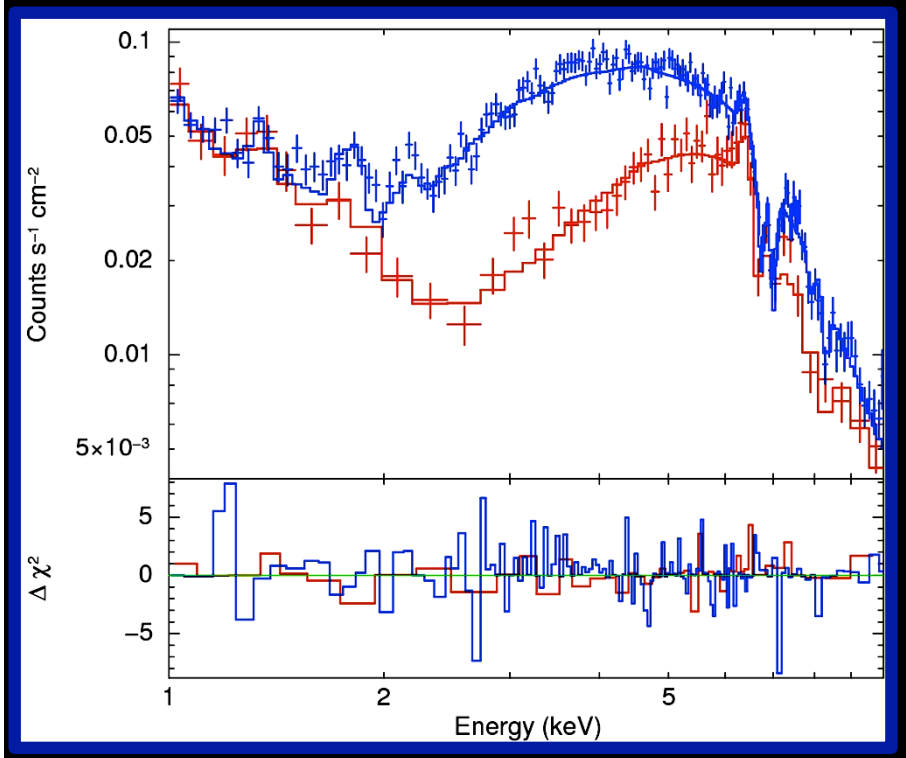
HR

N_H

CF

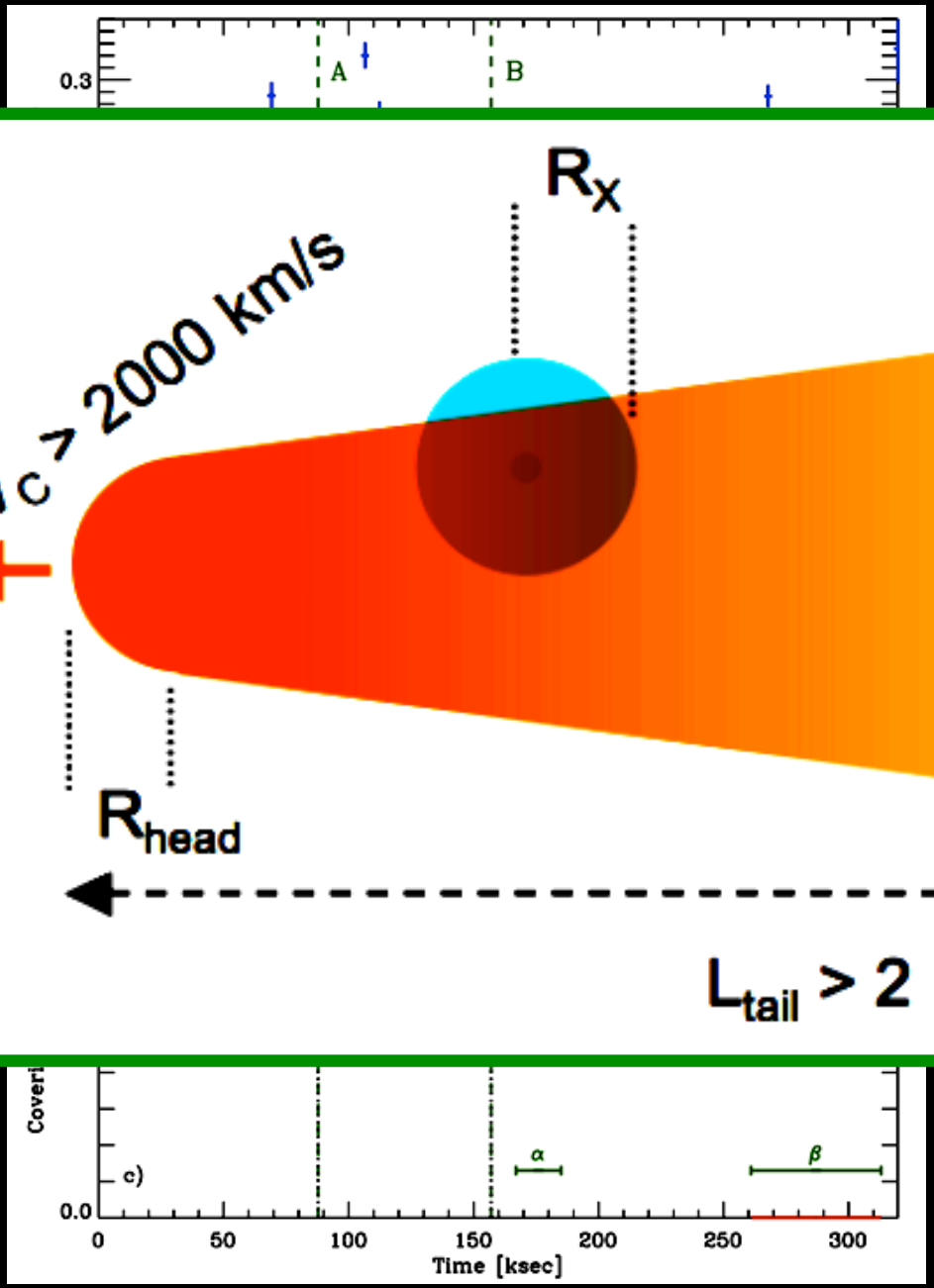


NGC 1365 Suzaku



Maiolino et al. 2010

1) Structure of the absorber

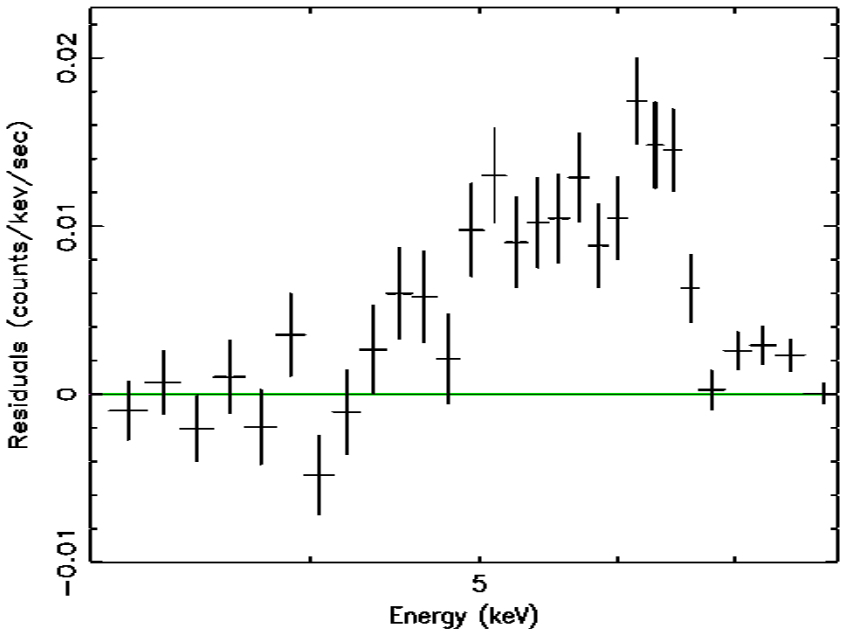


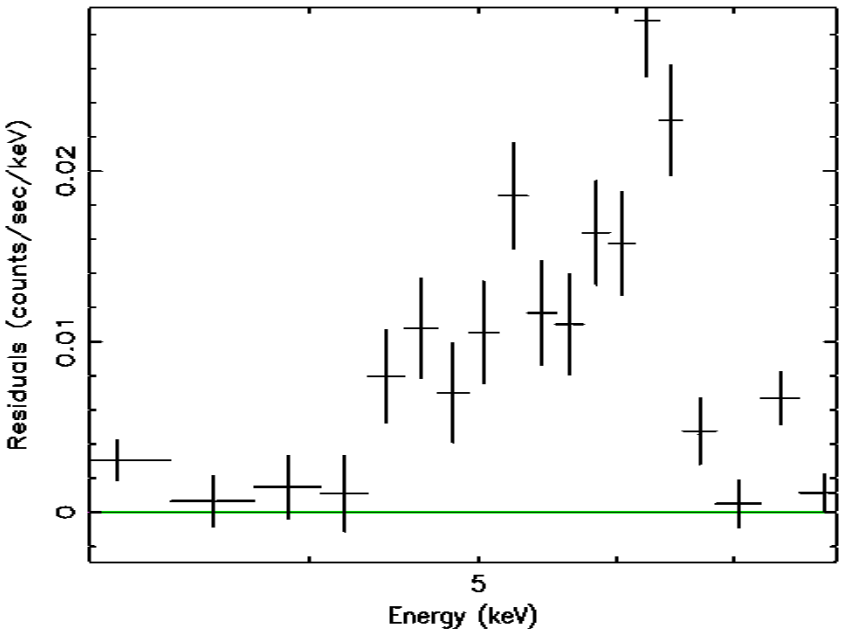
NGC 1365 Suzaku

Maiolino et al. 2010

Tomography of the X-ray source

A Relativistic Iron Line in NGC 1365



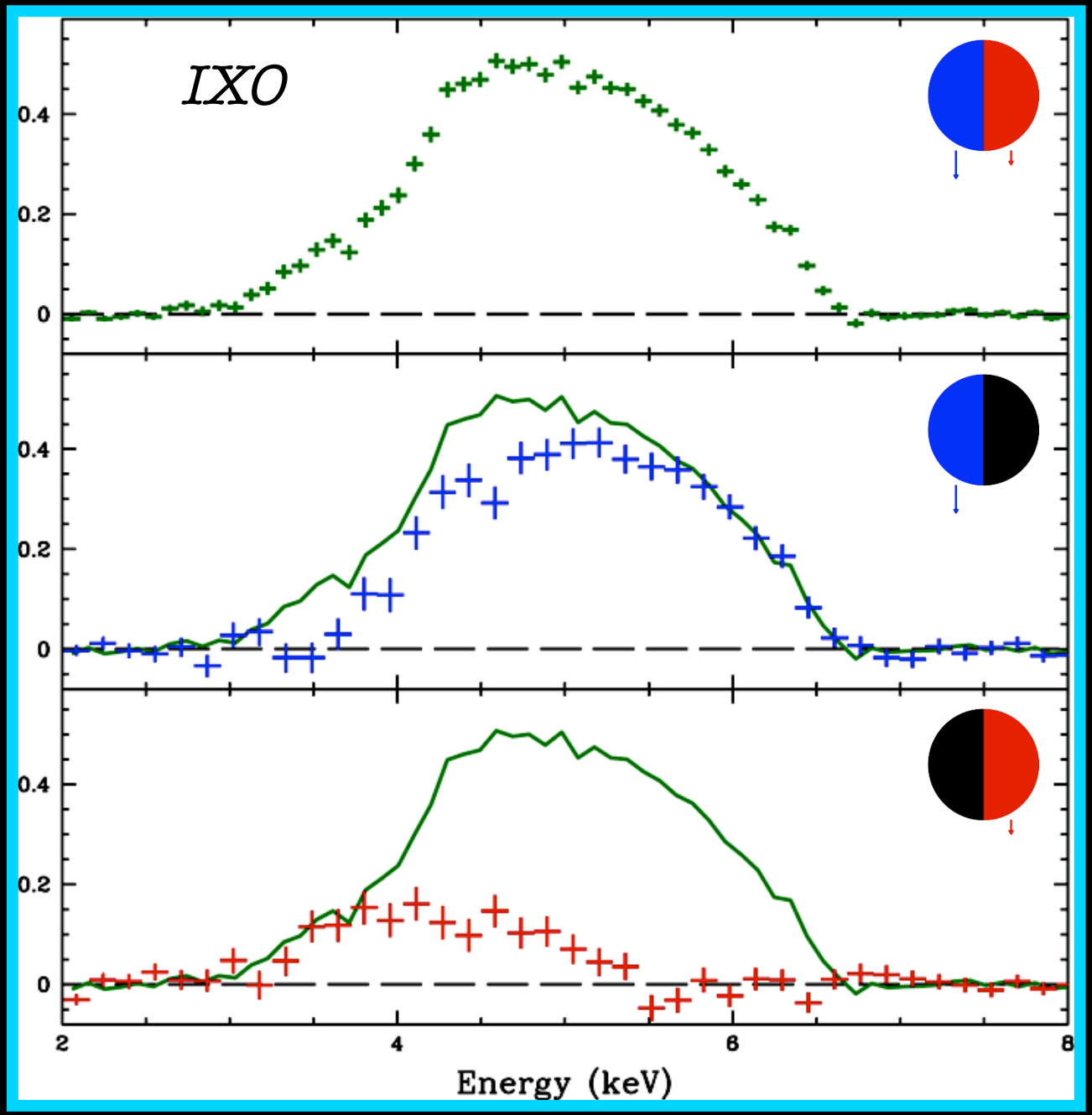


(Risaliti et al. 2009)

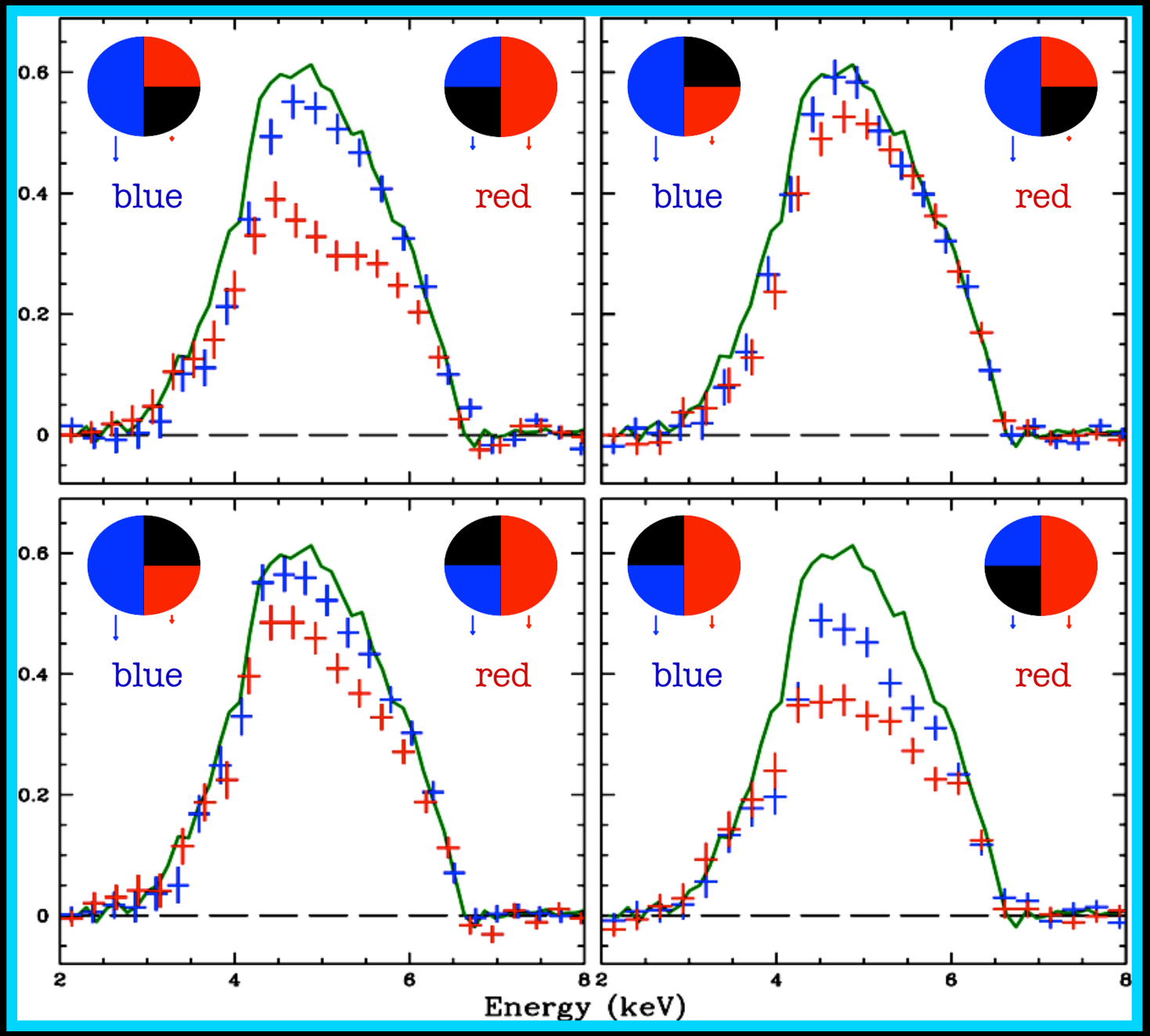
Assumptions:

1) It is really a relativistic line
2) Long look (>300 ks)
3) Source in Compton-thin state
4) Complete 10-hours C-thick eclipse during obs.

Simulation: IXO observation of the eclipsing iron line



IXO observation of the *already observed* eclipses



Simulation: XMM observation of the eclipsing iron line